

# Survival of Juvenile Chinook Salmon Migrating through the Sacramento- San Joaquin River Delta

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# 2 of 4 Salmon Runs are Threatened or Endangered

## Possible Causes

Dams

Habitat Loss

Habitat Degradation

Harvest

Hatcheries

Water Diversion

Water Export

Lack of run complexity

Ocean conditions

## Location

River

Delta

Estuary

Ocean

## Life Stage

Egg

Fry

Smolt

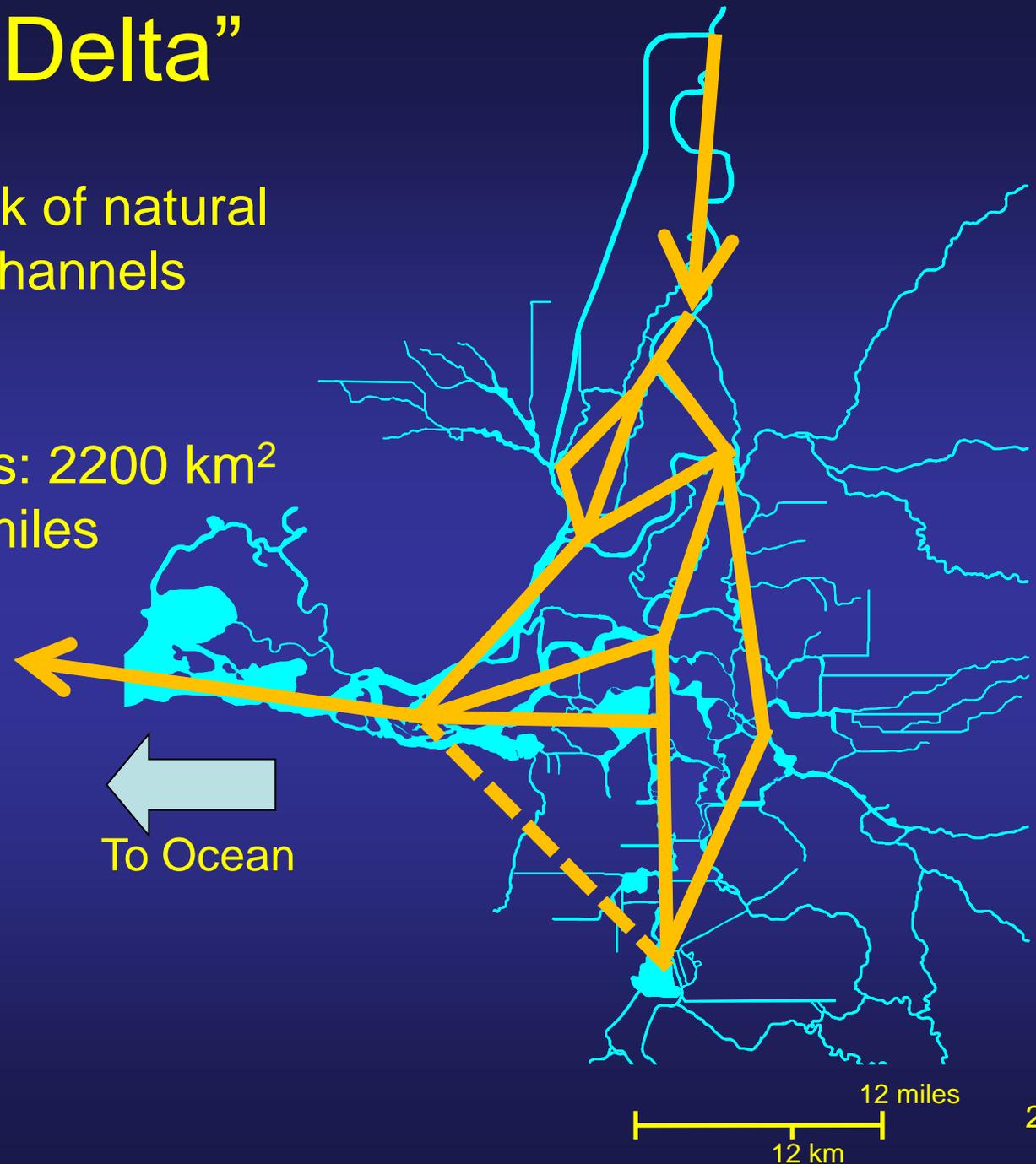
Adult

# “The Delta”

Complex network of natural and manmade channels

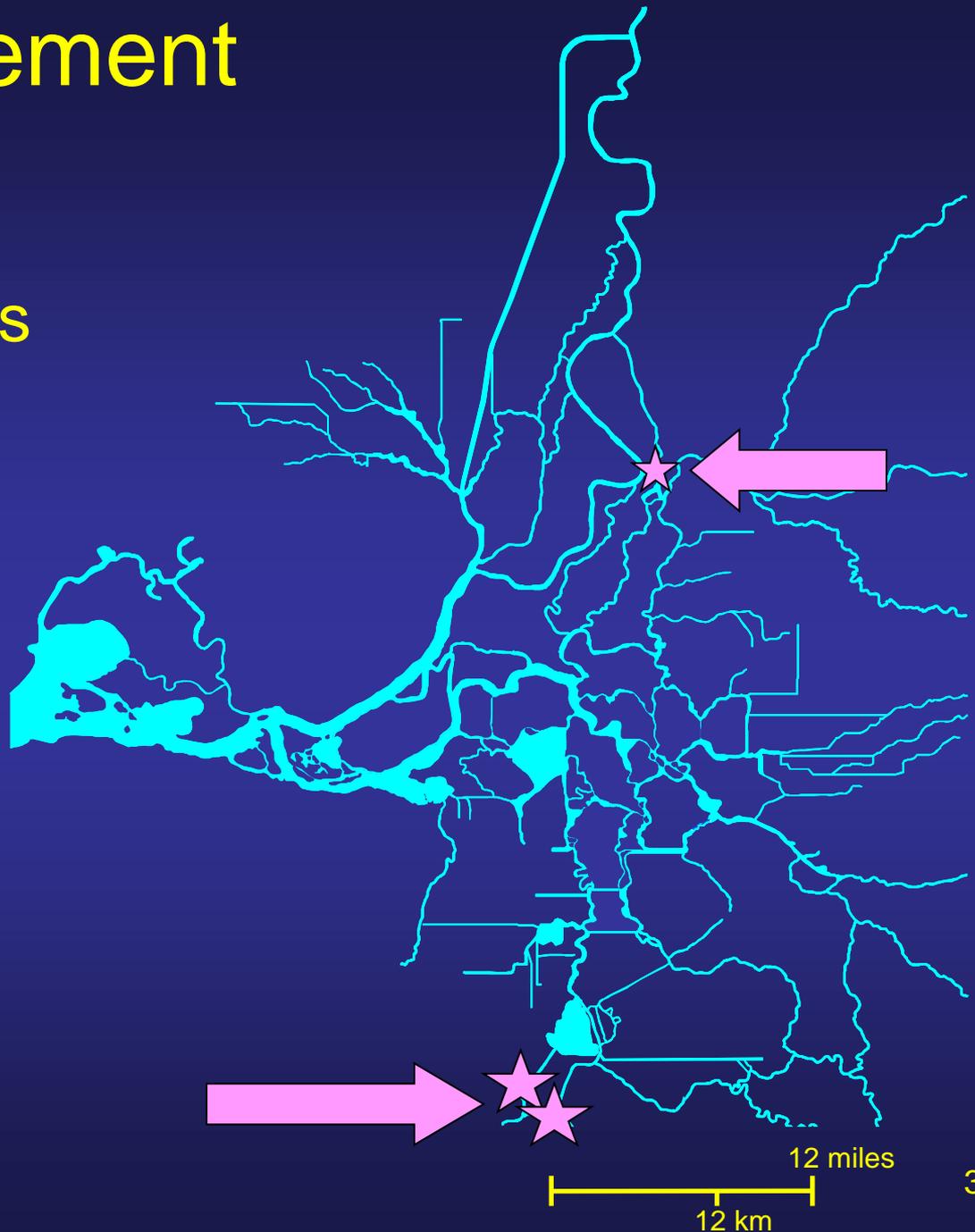
Historic wetlands: 2200 km<sup>2</sup>  
Channels: 700 miles

River inputs  
Tides  
Human actions

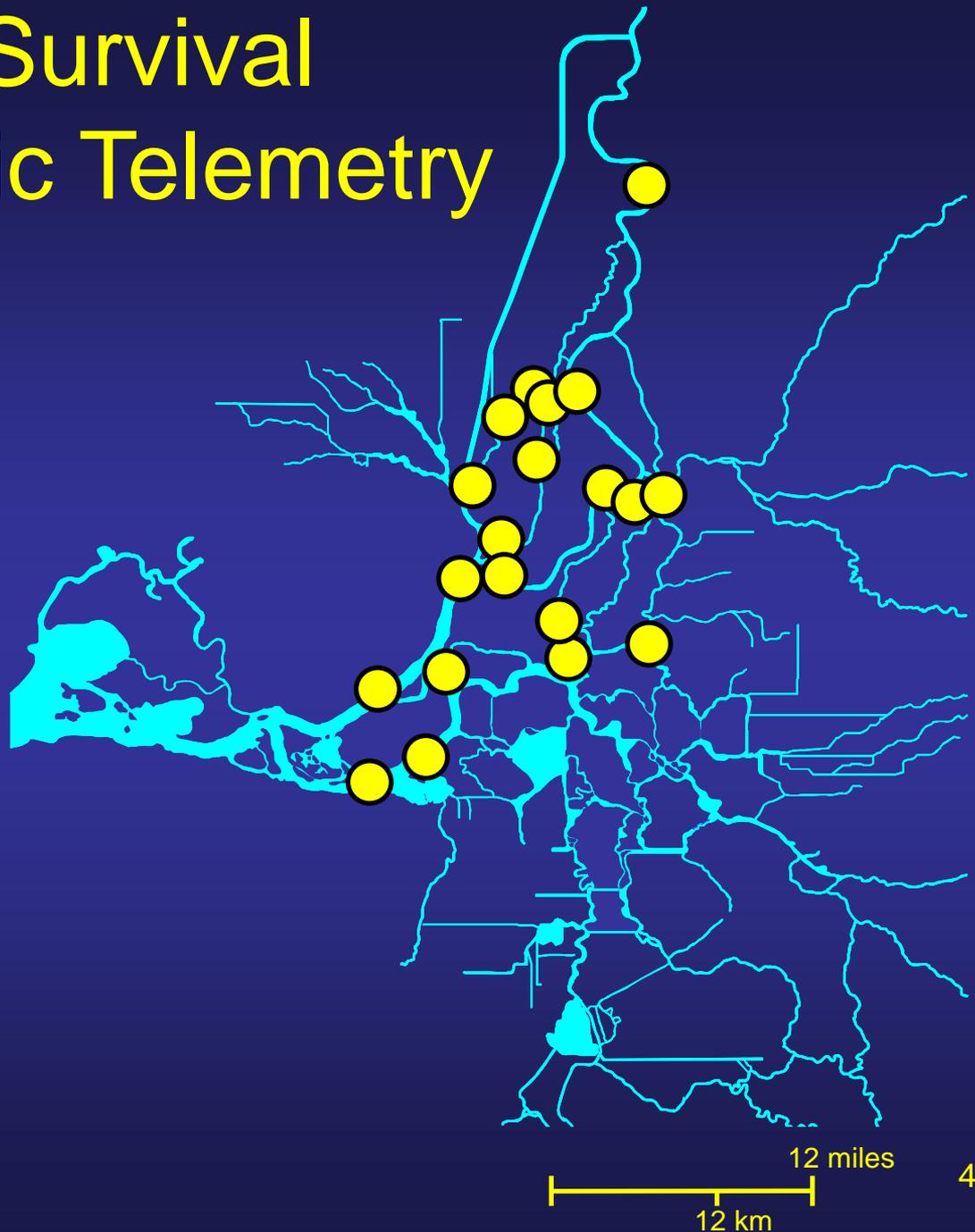


# Water Management

- Water Exports
  - pumping stations
- Water Routing
  - Delta Cross Channel

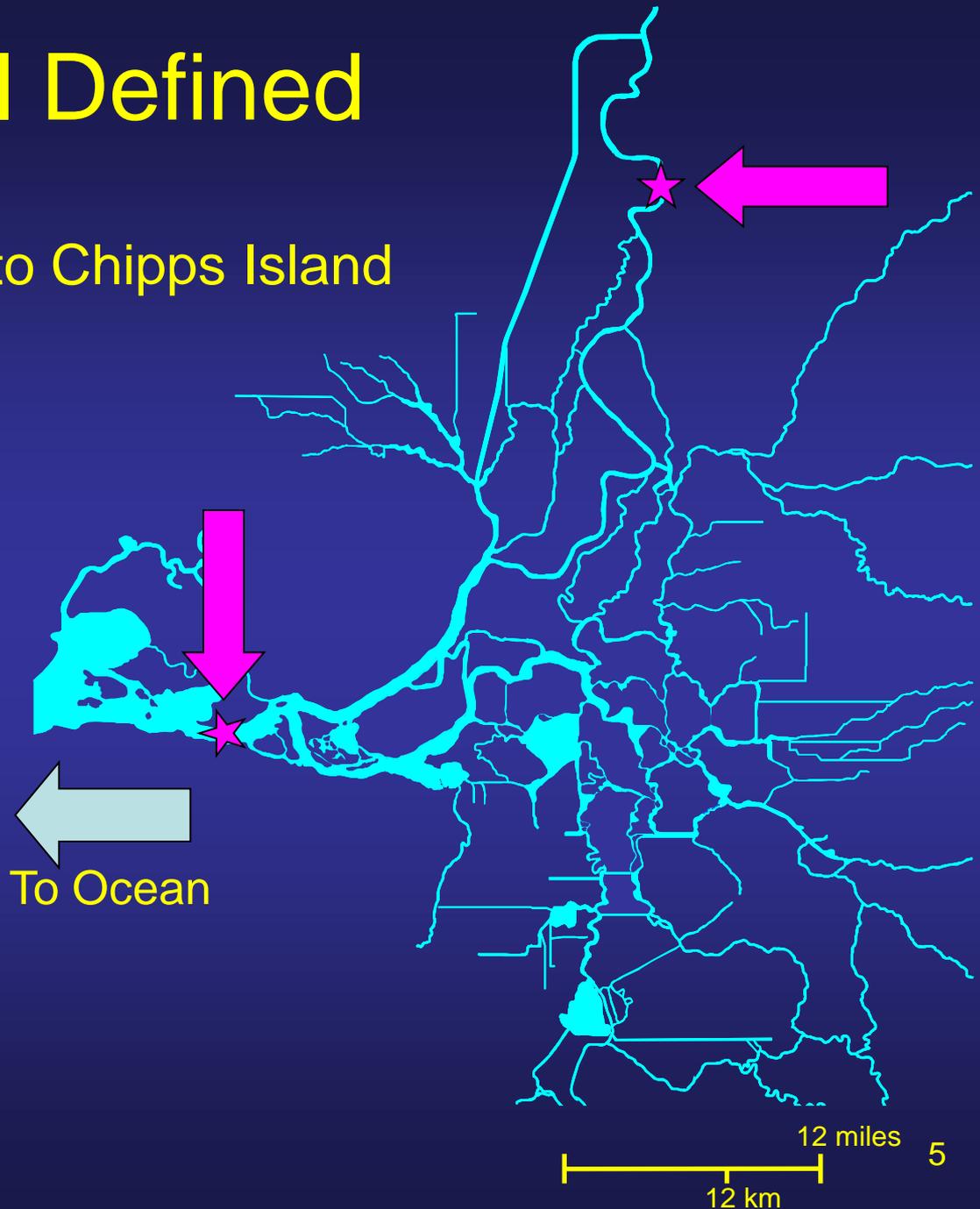


# Estimating Survival with Acoustic Telemetry



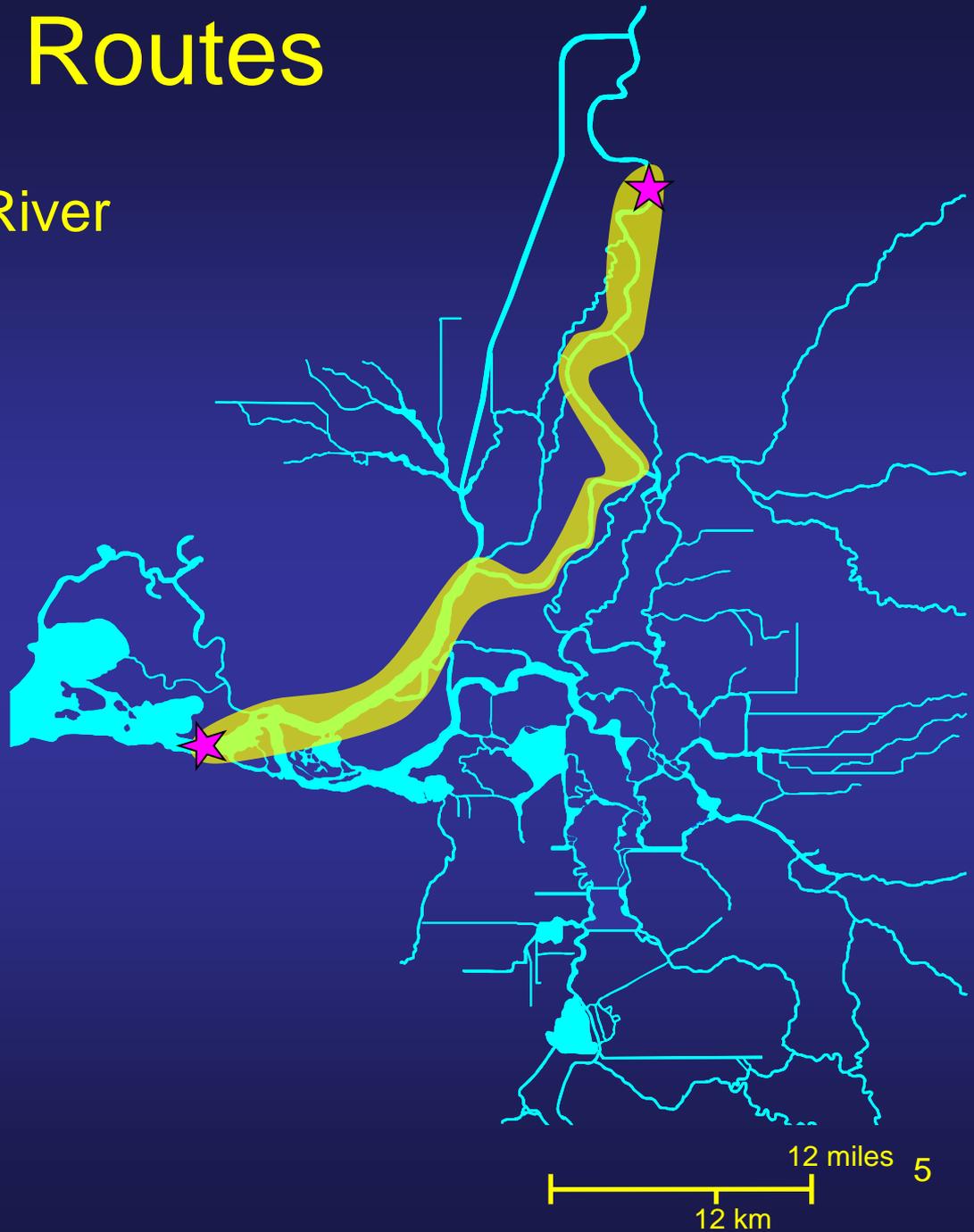
# Delta Survival Defined

~75 km from Freeport to Chipps Island



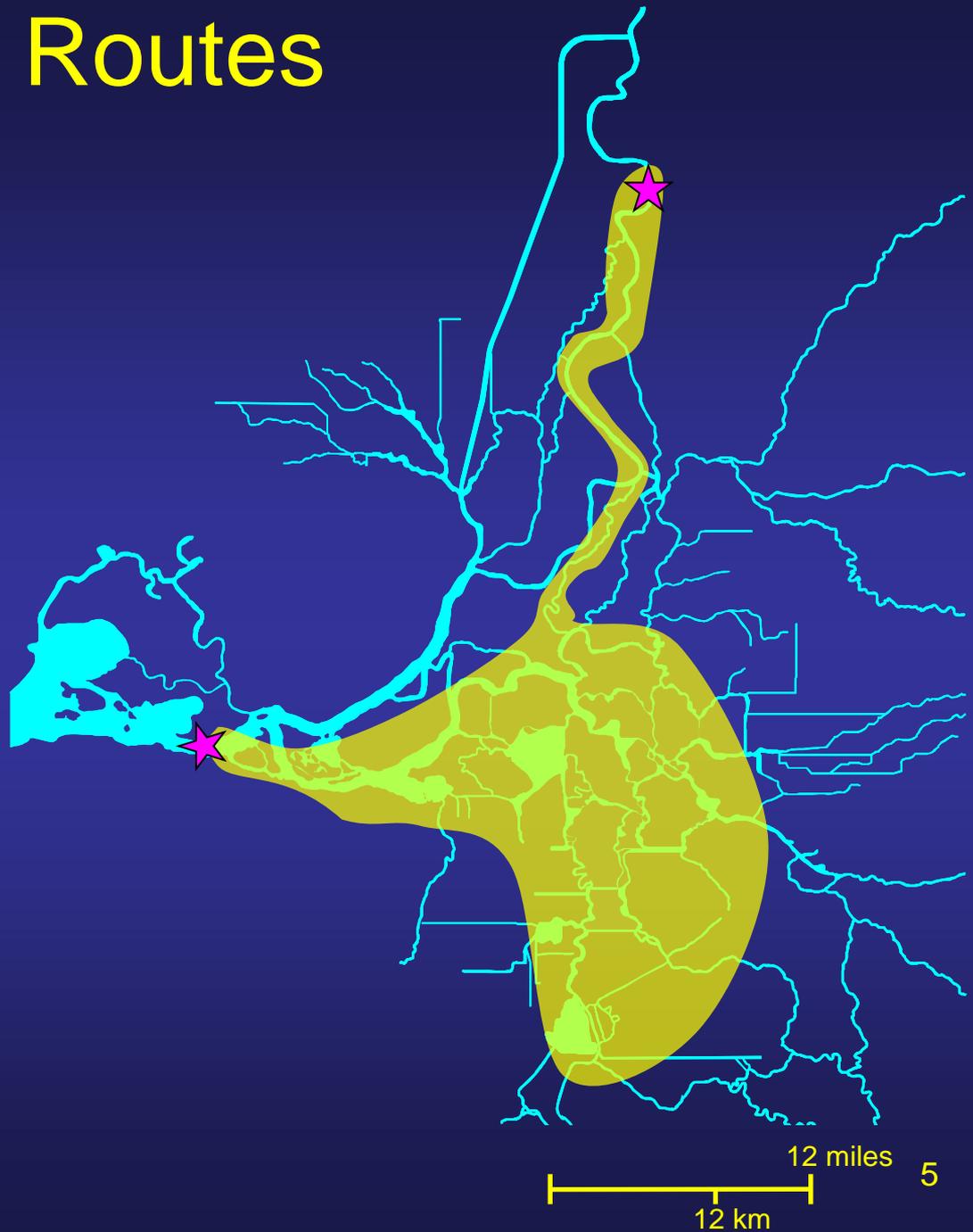
# Four Migration Routes

Mainstem Sacramento River



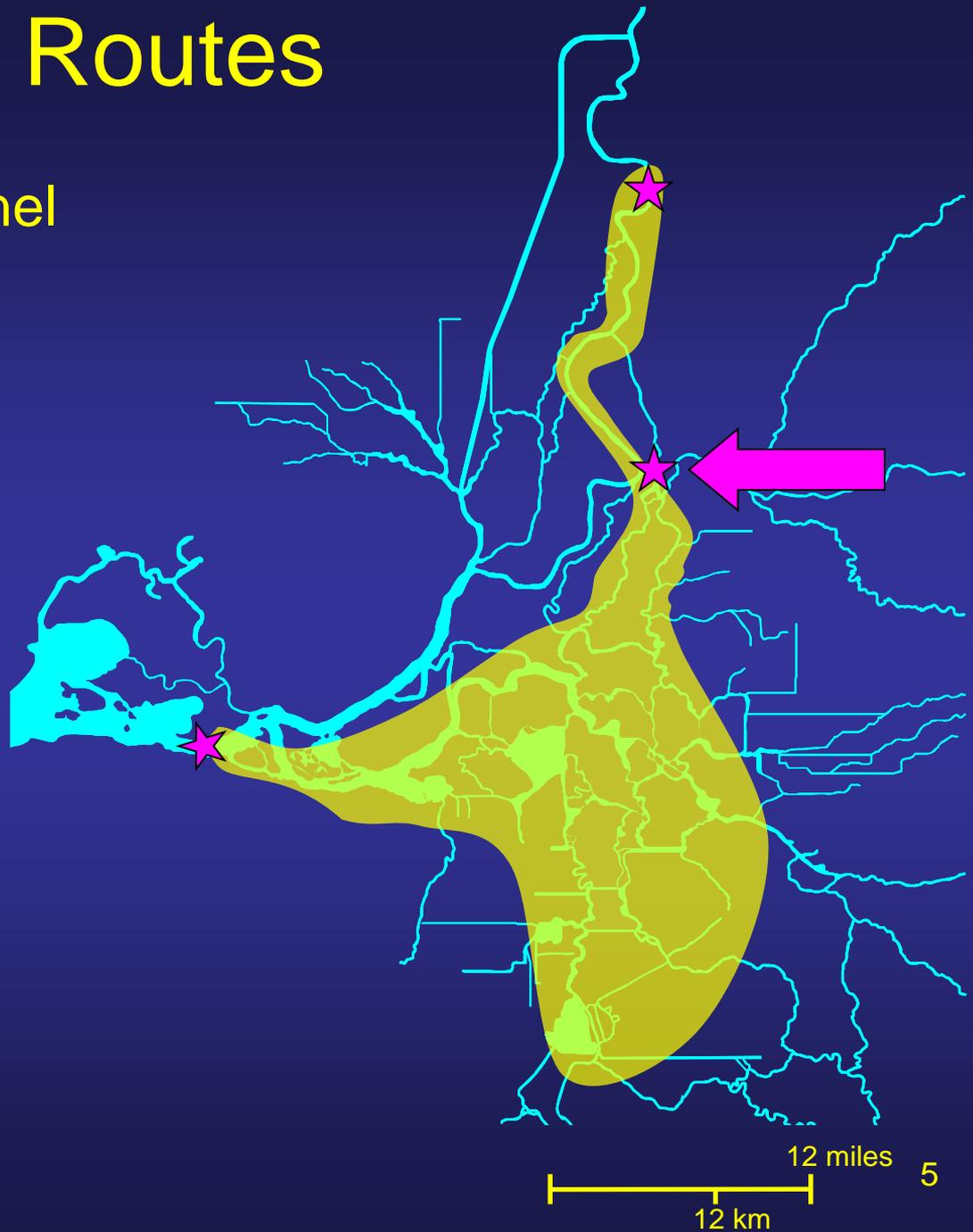
# Four Migration Routes

## Georgiana Slough



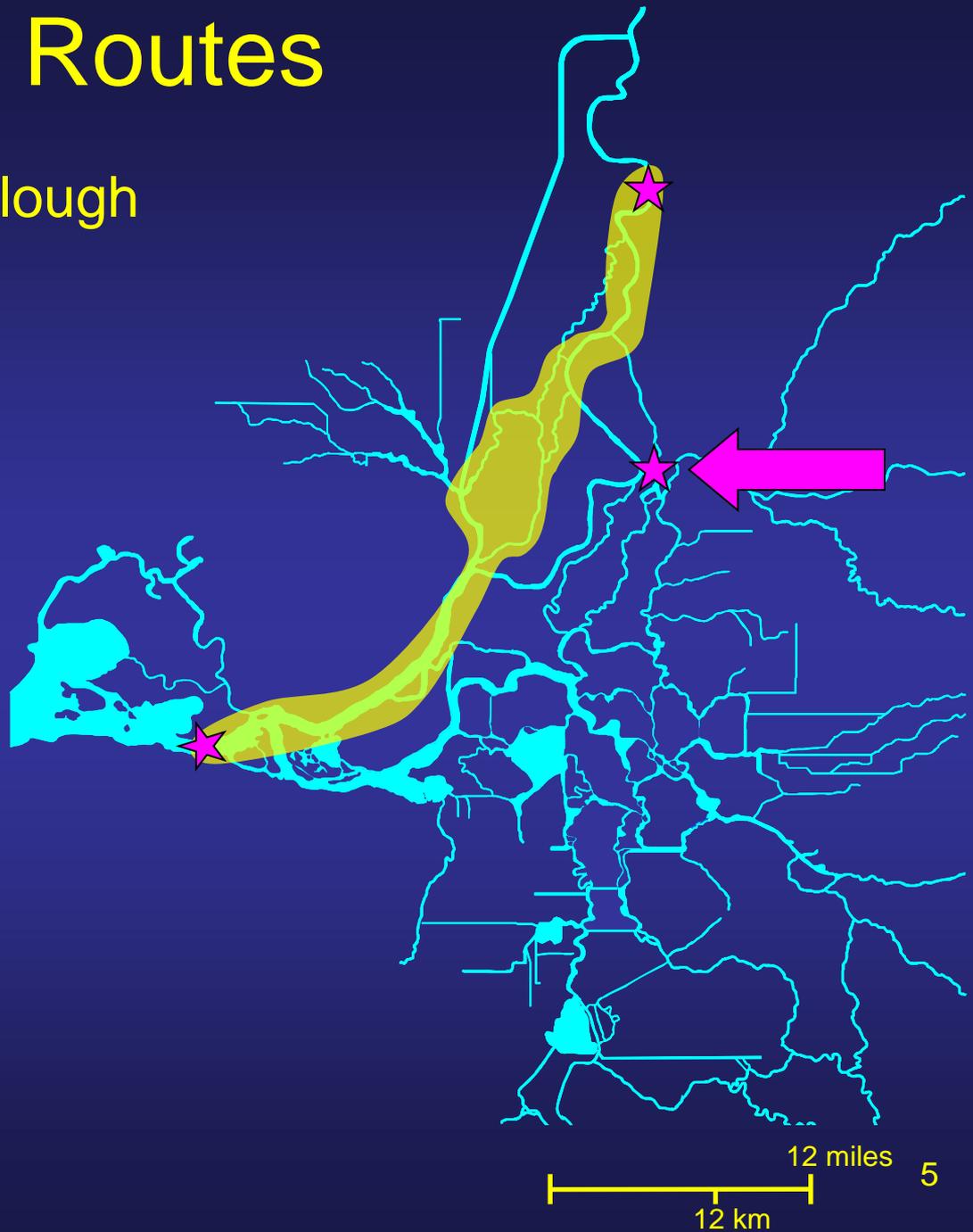
# Four Migration Routes

## The Delta Cross Channel



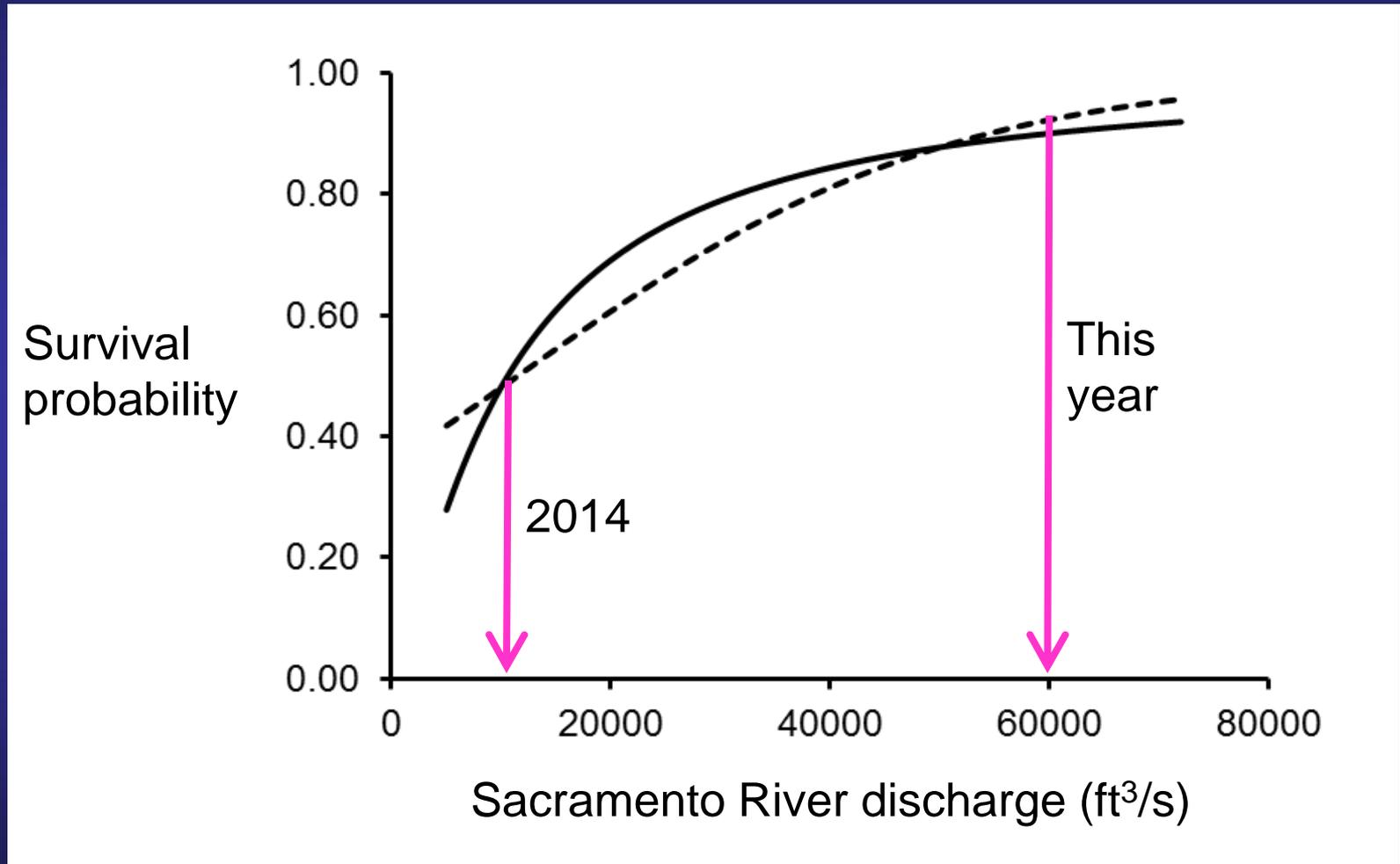
# Four Migration Routes

Sutter and Steamboat slough

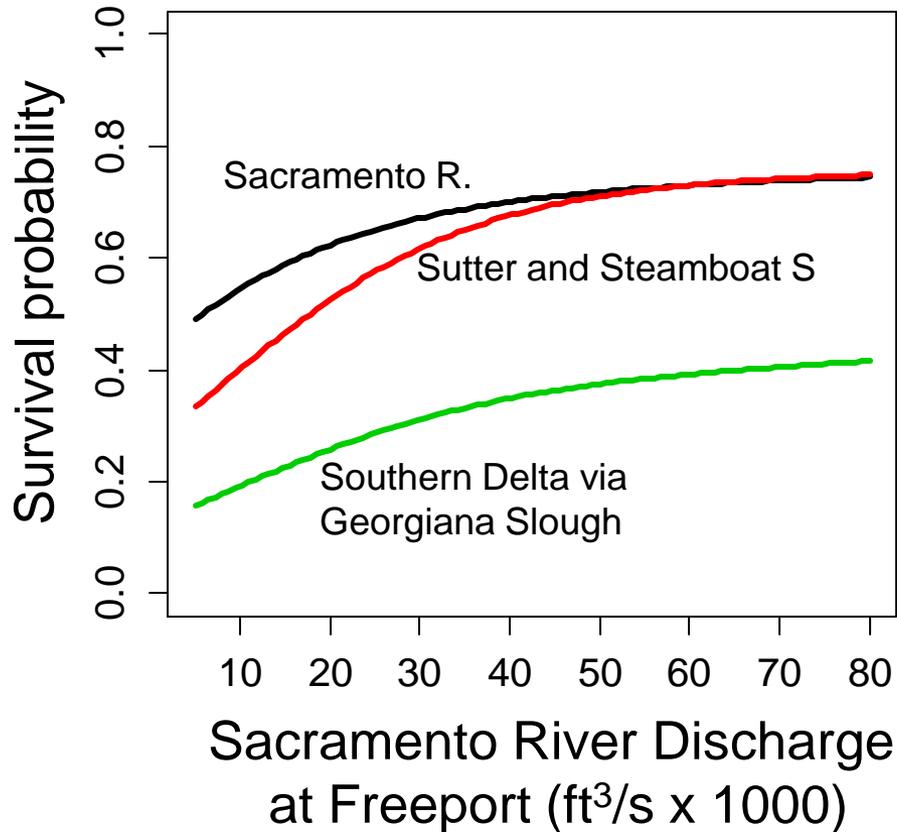


# Survival Increases with River Flow

## Survival in Sacramento River



# Survival Differs Among Migration Routes



Routing:

40 - 50% Sacramento

10 - 40% Sutter and

Steamboat S.

10 - 40% Southern Delta

Is this “low” survival?

Snake / Columbia River:

- 50% survival

- 400 km + 7 dams

# Conclusions

- Insights
  - Where fish go
  - How they respond to water levels
  - Effects on survival
- Better understand salmon responses to
  - Drought
  - Climate
- Science to support management decisions
  - Water quantity
  - Water routing

# Acknowledgements

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CA Department of Water Resources

Delta Stewardship Council